Dear Dr. Alekhin,

Thank you very much for your questions on the D0 W charge asymmetry results. The electron charge asymmetry paper has been published in the Phys. Rev. D [PRD 91, 032007 (2015)], please check the new version of paper. For the correlation coefficient of systematic uncertainties, we found an error recently, which the elements of tables in Table VII to XI were the square roots of calculated values, but will not affect the measured asymmetry. We are working on the submission of erratum, the corrected tables can be found at http://www-d0.fnal.gov/Run2Physics/wz/wasymmetry/Syst_Correlation_with_100_unfold.pdf

For each of your question, please find our response for each of your question below.

1) W charge asymmetry, " authors applied some corrections based on Pythia which might be different in other generator/model, and hence not quite reliable"

Answer:
The assumption made in the W boson charge asymmetry is the ratio of valence quark to sea quark, and in the analysis, we used the MC@NLO with CTEQ6.6 PDF set to get this distribution. Since it is an input that may introduce bias, we include the systematic uncertainty from the PDF inputs as an estimate of possible additional error, this is one of the primary systematic uncertainties.
As described in the paper, "To estimate the uncertainty from the PDF inputs, we determine the Q(yw, pTw) correction with 45 CTEQ6.6 PDF sets, perform the measurement with different Q(yw, pTw), and extract the uncertainty for each yw bin using prescription describe in Ref. [21]."

Indeed, the measured asymmetry is taking the ratio of antiquark to quark from MC@NLO as input, but we did two closure tests before applying this method to data. As shown in Fig. 1, the left plot is closure test (1) by taking the MC@NLO sample as pseudo-data, and performing all the unfolding procedures (except the corrections related to detector resolution); the right plot is closure test (2), by taking the MC (PYTHIA) with detector simulation as pseudo-data, performing all the unfolding procedures to the pseudo-data (all the corrections, unfolding used in data analysis). The unfolding procedures including the information get from MC@NLO + PDF sets. Then we compared the measured results with predictions,

as shown in Fig. 1, for both closure tests, good agreements have been achieved. If there is anything wrong from the MC@NLO + PDF set modeling, we should see some discrepancies between generator and measured distributions. These closure tests give us confidence to make this measurement.

2) Muon charge asymmetry, 7.3 fb-1, "result with 35 GeV are very inconsistent with 25 GeV"

Answer:
To address this question, we make some self-consistence check between the published Tevatron results, which including three results from different channels and experiments, as

(a) electron charge asymmetry, 1 fb-1, CDF Collaboration: http://www-cdf.fnal.gov/physics/ewk/2009/WChargeAsym/

(b) muon charge asymmetry, 7.3 fb-1, D0 Collaboration: http://journals.aps.org/prd/pdf/10.1103/PhysRevD.88.091102

(c) electron charge asymmetry, 10 fb-1, D0 Collaboration: http://journals.aps.org/prd/pdf/10.1103/PhysRevD.91.032007

CDF result of electron charge asymmetry is a preliminary results, only has statistical uncertainty presented in the figures. Considering different kinematic cuts used in above three papers, four comparison plots are shown in Fig. 2 to Fig. 5, conclusions are shown below:

(1) In Fig. 2, with the kinematic cuts pT(l) > 25 GeV and neutrino pT > 25 GeV, all the Tevatron results are consistent with each other, and agreed with theoretical predictions. The last data point of CDF result is somewhat inconsistent with the D0 result and predictions, but with only one point, it's hard to see the trend of discrepancy.

(2) In Fig. 3 (Fig. 4), with the kinematic cuts 25 < pT(l) < 35 GeV (pT(l) > 35 GeV) and neutrino pT > 25 GeV, the D0 electron charge asymmetry results and the CDF asymmetry results are consistent with each other in most of region, and disagreed with most theoretical predictions. And there are some discrepancies between D0 and CDF in the eta region from 0.5 to 1.0, but for the high eta region, as |eta| > 1.5, D0 and CDF results are in good agreement with each oth-

er.

(3) In Fig. 5, with the kinematic cuts pT(l) > 35 GeV and neutrino pT > 35 GeV. The D0 muon channel results are in good agreement with the D0 electron channel results in all eta regions, and are away from the theoretical predictions. With the limited muon detector coverage at D0, the muon charge asymmetry only extended to |eta| = 2.

More details about these comparisons can be found in:
http://www-d0.fnal.gov/Run2Physics/wz/wasymmetry/Comparison_detailed/
(detailed version)
and
http://www-d0.fnal.gov/Run2Physics/wz/wasymmetry/Comparison_simplified/
(clean version)

After the consistent check between these three Tevatron results, we found the charge asymmetry results from Tevatron are in a reasonable agreement with each other. Considering these results are from different experiments, different channels, different analyzers, we would like to conclude that the charge asymmetry results from Tevatron are consistent with each other, but have discrepancies with predictions using current PDF sets. So we would like to suggest the future PDF fitting should include the Tevatron lepton charge asymmetry results.

Please let us know if you have any further question, and we hope the Tevatron lepton charge asymmetry results can be included in the future PDF fittings.

Regards,
Hang Yin for the D0 Collaboration

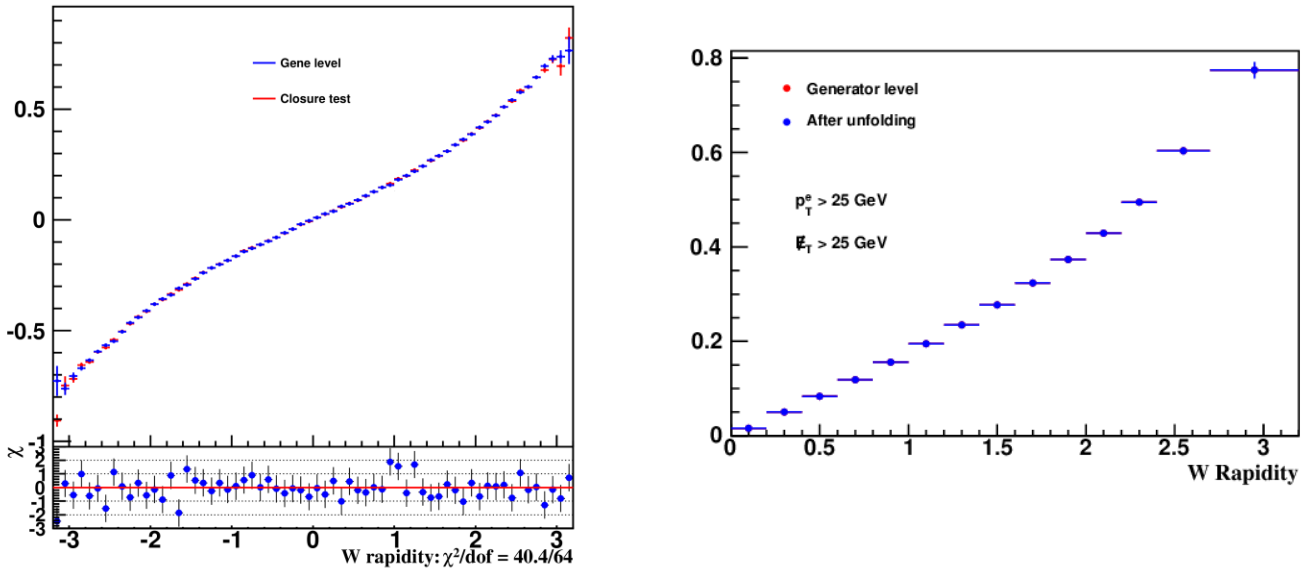

Fig 1: The closure tests on the W boson charge asymmetry measurement. (Left plot) use 10 M MC@NLO as pseudo-data, and perform the unfolding procedure (without detector resolution unfolding), the measured asymmetry (red) compares with generator level asymmetry (blue), also the \chi distribution in each |y_W| bin. (Right plot) use PYTHIA MC with detector simulation as pseudo-data, and perform all the unfolding procedure, the measured asymmetry (blue) compares with the generator level asymmetry (red).

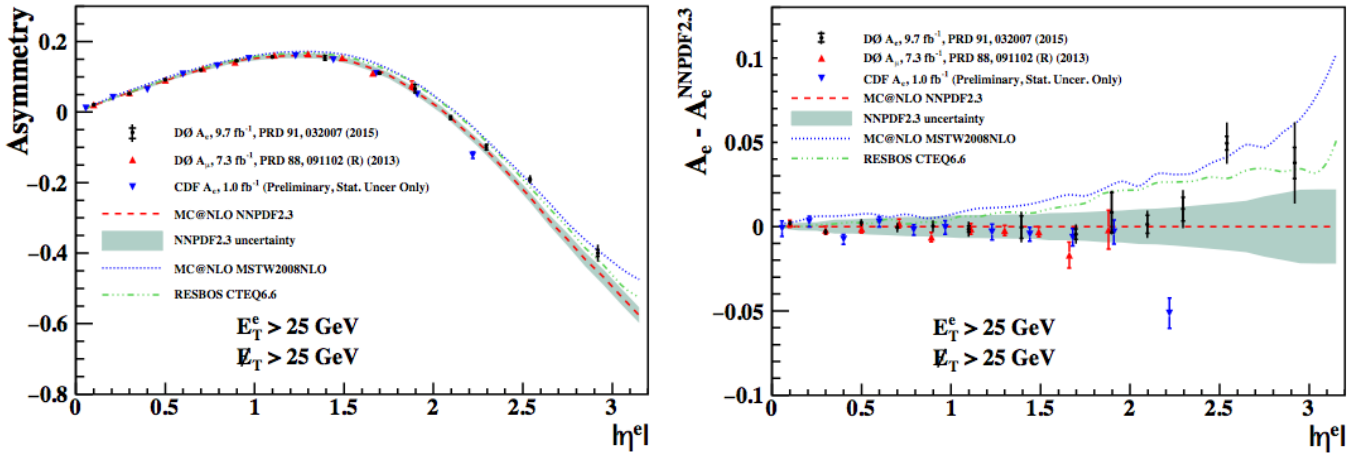

Fig 2: CDF electron channel vs. D0 electron channel vs. D0 Muon channel. The lepton charge asymmetry distribution after CP folding with kinematic cuts lepton pT > 25 GeV, neutrino pT > 25 GeV. (Left) Comparison between the measured asymmetry and predictions and (Right) the differences between the data and MC predictions and the predicted central value from MC@NLO using the NNPDF2.3 PDF set.

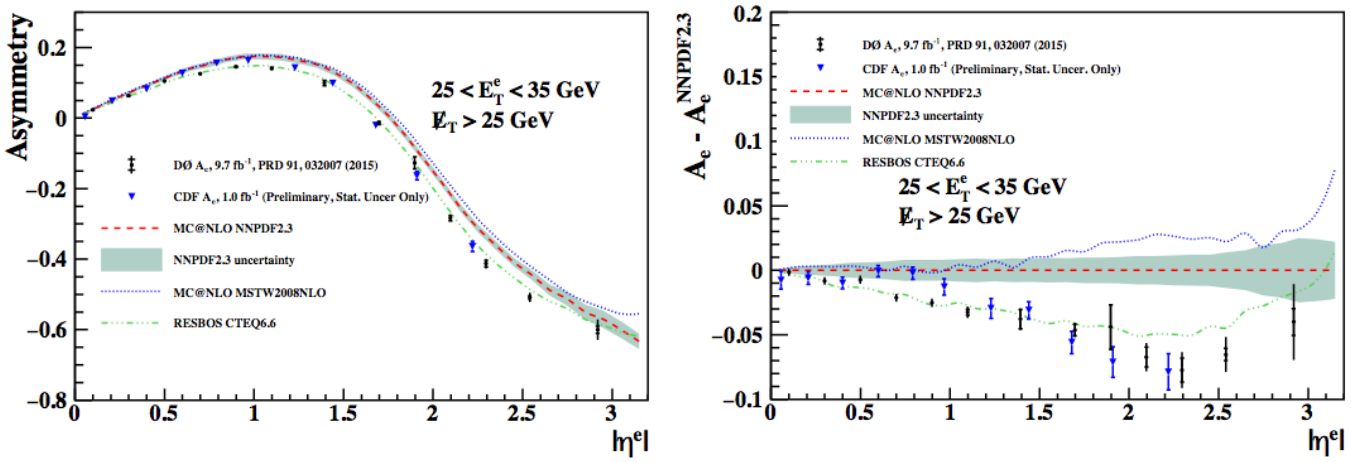

Fig 3: CDF electron channel vs. D0 electron channel. The lepton charge asymmetry distribution after CP folding with kinematic cuts lepton 25 < pT < 35 GeV, neutrino pT > 25 GeV. (Left) Comparison between the measured asymmetry and predictions and (Right) the differences between the data and MC predictions and the predicted central value from MC@NLO using the NNPDF2.3 PDF set.

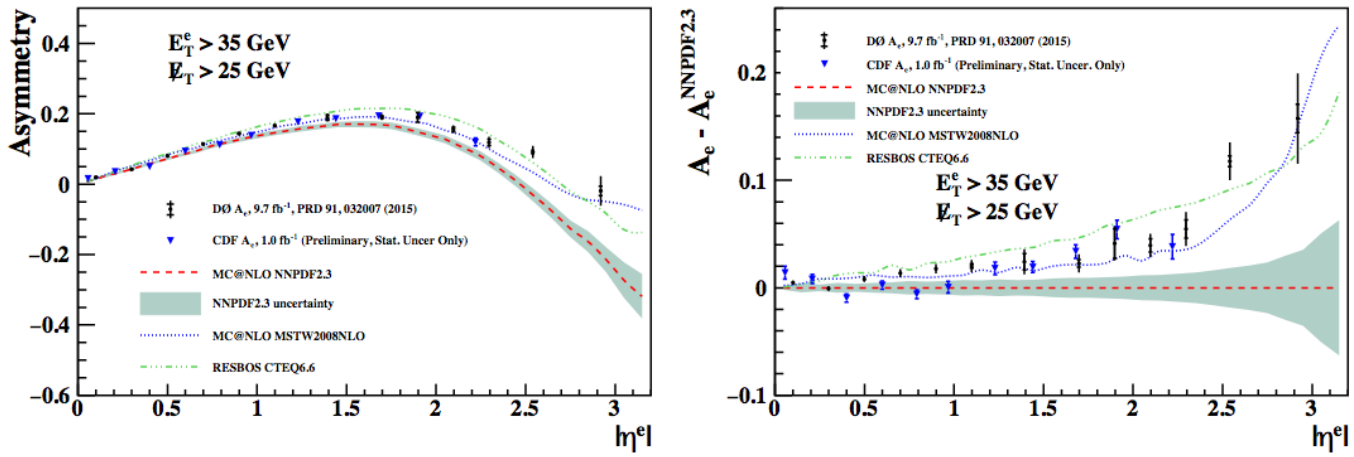

Fig 4: CDF electron channel vs. D0 electron channel. The lepton charge asymmetry distribution after CP folding with kinematic cuts lepton pT > 35 GeV, neutrino pT > 25 GeV. (Left) Comparison between the measured asymmetry and predictions and (Right) the differences between the data and MC predictions and the predicted central value from MC@NLO using the NNPDF2.3 PDF set.

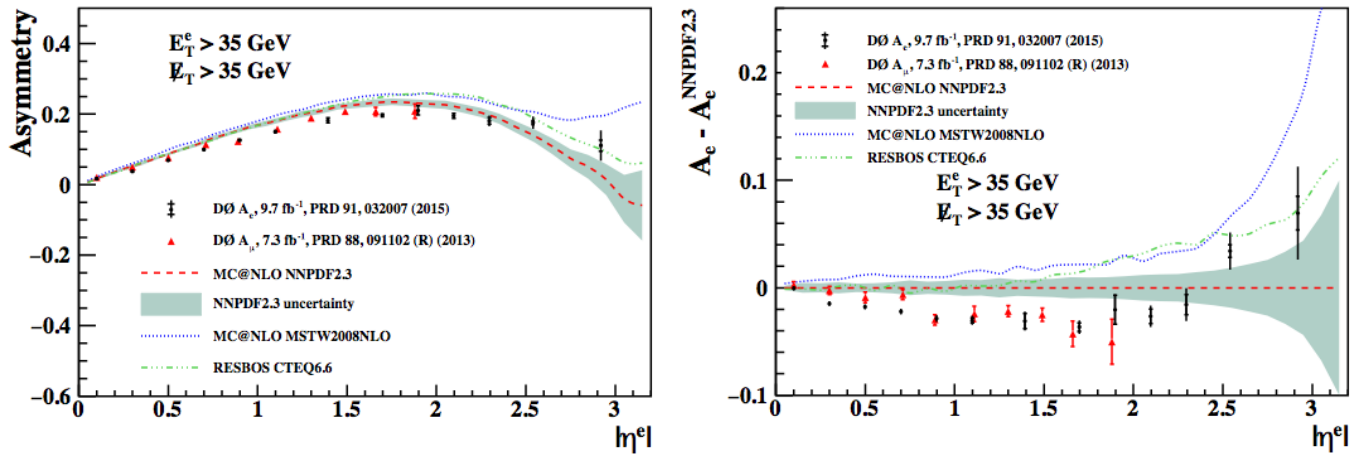

Fig 5: D0 muon channel vs. D0 electron channel. The lepton charge asymmetry distribution after CP folding with kinematic cuts lepton pT > 35 GeV, neutrino pT > 35 GeV. (Left) Comparison between the measured asymmetry and predictions and (Right) the differences between the data and MC predictions and the predicted central value from MC@NLO using the NNPDF2.3 PDF set.